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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/667,232

09/18/2003

Shigekazu Ohtomo

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11/15/2005

EXAMINER

CAO, ALLEN T

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ART UNIT

PAPER NUMBER

2652

DATE MAILED: 11/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/667,232

Applicant(s)

OHTOMO ET AL.

Examiner

Allen T. Cao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 6-13 and 15-22 is/are pending in the application.
- 4a) Of the above claim(s) 12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-11, 13 and 15-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-3, 6-13 and 15-22 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 13, 16-18, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narumi et al (US. 6,563,667 B2) in view of Cates (US. 6,788,497 B1).

Narumi et al discloses a thin film magnetic head (figure 10) having a read unit formed above a substrate 150, including a lower shield 182, a read element 110 and an upper shield 186; a write unit having a lower pole piece 186, an upper pole piece 185, and a coil 142 placed between the lower pole piece and the upper pole piece.

Narumi et al also discloses that at least one of the lower shield layer and upper shield having two layers (figure 4 and column 7, line 29 to column 8, line 6); wherein the layers are made of a magnetic material.

Narumi et al inherently discloses that the coefficient of thermal expansion of the first layer is different from the coefficient of thermal expansion of the second layer (Narumi et al discloses that the first magnetic layer and the second magnetic layer of either of the lower shield or the upper shield are made by different material, thus it is inherently that their coefficient of thermal expansion are different; furthermore, Narumi et al teaches that its have different in electric resistivity); al as set forth in claims 1 and

13.

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Narumi et al also inherently discloses that the coefficient of thermal expansion of the first layer is larger than the coefficient of thermal expansion of the second layer as claimed in claims 16 and 20.

Narumi et al further discloses that the first layer is formed between the second layer and the read element (claims 17 and 21); and the first layer and the second layer are magnetically connected (claims 18 and 22).

Narumi et al does not disclose a non magnetic layer separated the read unit and the write unit as recited in claims 1 and 13.

Cates discloses a thin film magnetic head 300 (figure 9) having a read unit 102, formed above a substrate 116, including a lower shield 112, a read element 108 and an upper shield 110; a write unit 202 having a lower pole piece 226, an upper pole piece 228, and a coil 232 placed between the lower pole piece and the upper pole piece.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the thin film magnetic head of Narumi et al with a separated non magnetic layer to separate the read unit and the write unit as set forth, supra as taught by Cates.

The rationale is as follows: One of ordinary skill in the art would have been motivated to modify the thin film magnetic head of Narumi et al with a separated non magnetic layer to separate the read unit and the write unit as set forth, supra as taught by Cates to isolate/protect between the upper shield of the read unit and the lower pole of the write unit to prevent the two different magnetic materials between the upper

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shield and the lower pole from inter-diffusing during fabrication and life span of the combined magnetic head.

Regarding claim 2, Narumi et al as modified by Cates do not disclose that the magnetic alloy is a crystalline.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to crystalline the magnetic alloy of the shield layer of Narumi et al as modified by Cates through a lab routine experimentation and optimization to improve the magnetic structure characteristics of the magnetic alloy.

3. Claims 3 and 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narumi et al and Cates as applied to claim 1 above, and further in view of Pust et al (US 2003/0081359 A1).

Regarding claim 3, Narumi et al as modified by Cates do not disclose that the NiFe alloy layer has a composition comprising 30 to 55 wt% Ni.

Pust et al discloses a NiFe alloy layer has a composition comprising 30 to 55 wt% Ni (paragraph [0034]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture the NiFe alloy layer of Narumi et al as modified by Cates having a composition comprising 30 to 55 wt% Ni as set forth, supra as taught by Pust et al to improve the shielding characteristics, thus improve read/write characteristics of the magnetic head.

Regarding claim 6, Narumi et al as modified by Cates do not disclose that the NiFe alloy layer having a composition mainly comprising 80 wt% Ni.

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Pust et al discloses a NiFe alloy layer has a composition mainly comprising 80 wt% Ni (paragraph [0056]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to manufacture the NiFe alloy layer of Narumi et al as modified by Cates having a composition mainly comprising 80 wt% Ni as set forth, supra as taught by Pust et al to improve the shielding characteristics, thus improve read/write characteristics of the magnetic head.

Regarding claims 7 and 10, see the rejection of claim 2 in the above rejection

Regarding claims 8 and 11, see the rejection of claim 3 as set forth, supra.

Regarding claim 9, Narumi et al discloses that a ratio of a thickness of the second magnetic material to a sum of thickness of the lower shield and the upper shield is 30% or more (column 7, lines 32-39).

4. Claims 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narumi et al and Cates as applied to claims 1 or 13 above, and further in view of Kief et al (US. 6,788,497 B1).

Narumi et al as modified by Cates do not clearly disclose that coefficient of thermal expansion of the second layer is  $11.5 \times 10^{-6}$  /K or less.

Kief et al discloses a thin film magnetic head 200 having a read unit 209, formed above a substrate 207, including a lower shield 214, a read element 218 and an upper shield 216; a write unit (writer portion; column 3, line 36; figure 2-1) having a lower pole piece 216, an upper pole piece 224, and a coil 226 placed between the lower pole piece and the upper pole piece.

Kief et al also discloses that the lower shield layer 214 having two layers 302 and 306; wherein the layer 302 is a magnetic layer; and a lower pole piece/upper shield 216 also having two layers 304 and 308; wherein the layer 304 is a magnetic layer and the layer 308 is a non-magnetic layer which separated the read unit and the write unit.

Kief et al further discloses that the magnetic layers of the shields have a low coefficient of thermal expansion of  $11.5 \times 10^{-6}$  /K or less (column 4, line 64 to column 5, line 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the second layer of the thin film magnetic head of Narumi et al as modified by Cates with a coefficient of thermal expansion of  $11.5 \times 10^{-6}$  /K or less as set forth, supra as taught by Kief et al.

The rationale is as follows: One of ordinary skill in the art would have been motivated to provide the second layer of the thin film magnetic head of Narumi et al as modified by Cates with a coefficient of thermal expansion of  $11.5 \times 10^{-6}$  /K or less as set forth, supra as taught by Kief et al in order to achieve an optimal magnetic flux induction during recording and to also maintain a safe distance so as to prevent any catastrophic, physical contact between the read/write element and a spinning magnetic disk/medium..

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 1-3, 6-11, 13, 15-19, and 20-22 have been considered but are moot in view of the new ground(s) of rejection.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen T. Cao whose telephone number is (571) 272-7569. The examiner can normally be reached on Mon - Thurs (7:30 - 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen Cao  
Primary Examiner

AC  
November 3, 2005